

ACCIDENTAL POISONING MORBIDITY AMONG CALIFORNIA CHILDREN

by Henry Anderson

PART I: NUMBERS AND RATES

A. Introduction

Available evidence suggests that morbidity and mortality from poisoning tend to be particularly serious problems at the two ends of the age continuum: among the young and the old. Among the elderly, many poisonings are accidents (the result of failing eyesight, confused memory, etc.); many are attempts at selfdestruction; it is sometimes very difficult to disentangle the two. Among children, however, practically all poisonings are accidental.

In terms of prevention, intent makes a profound difference. Accidental poisonings, for example, may often effectively be prevented by changing the physical environment: making the tops of medicine bottles more difficult for children to remove, and the like. Suicides and attempted suicides, on the other hand, are not likely to be significantly affected by any imaginable changes in the physical environment. If guard rails were installed on the Golden Gate Bridge, the roughly ten or twelve persons who jump from that bridge in the average year would presumably jump from some other high place, and if guard rails were put on every place over thirty feet high, they could turn to poison, and if all poison sales were stopped, they could turn to guns, and if all gun sales were stopped, they could slash their wrists in a warm bath; and if the sale of razor blades and knives were outlawed, they could hang themselves by their neckties, belts, or shoelaces. All potentially lethal artifacts can never be removed from the environment. The problem in preventing suicide is to make life seem worth living -- and that problem requires the best efforts not only of health professionals and environmental engineers but every other social institution and functionary.

Therefore, if epidemiological understanding and control are the goals of pesticide and other poisoning studies, the prospects for accomplishment, for the

time being at least, are perhaps greatest in the area of accidental poisonings -- which is to say, perhaps greatest with respect to childhood poisonings, where the data are not muddled by cases in which intent is ambiguous and unprovable.

For twelve years, 1955-1967, the California Department of Public Health carried on a series of studies of childhood accidents and injuries within its Bureau of Maternal and Child Health.¹ Among other types of accidents, a number of these studies were concerned with poisonings. The following discussion includes some of the Family Research Center's data which were published, some which were never published, and some extrapolations and interpretations which are the responsibility of the present writer alone.

B. Study Design

A basic methodological problem plagues virtually every study of poisoning morbidity: how to translate numbers of cases into incidence rates? A wealth of numbers may be obtained from hospital records, but what is the "population at risk?" Data may be obtained from the Workmen's Compensation system, but is it fair to lump in the same denominator highly educated and sophisticated workers who are intimately acquainted with the benefits of the system, together with large numbers of uneducated and unsophisticated workers (e.g., 700,000 agricultural workers) many of whom have literally never heard of Workmen's Compensation Insurance, much less how to go about filing a claim?

¹ See, for example, Manheimer, D., and Mellinger, G., "1959 Child Accident Survey," Bulletin of the Alameda-Contra Costa Medical Association, 16:17-19 (Nov., 1960); Stallones, R., and Corsa, L., Jr., "Epidemiology of Childhood Accidents in two California Counties," Public Health Reports, 76:25-36 (Jan., 1961); Manheimer, D., Mellinger, G., and Dewey, J., "Methodology of the Childhood Accident Epidemiology Project," California State Department of Public Health monograph, 1966; Manheimer, D., Dewey, J., Mellinger, G., and Corsa, L., Jr., "50,000 Child-Years of Accidental Injuries," Public Health Reports, 81:519-533, (June, 1966).

As we shall see in Part II, below, the Family Research Center was unable to overcome this problem in some of its work, and it was possible to reckon findings only in the form of numbers and internal percentages. On other occasions, however, the Center devised ways to cope with the problem of establishing a population base. One of these ways was to study data from the Kaiser Foundation Health Plan, in which there is a group "at risk" of known parameters, and, furthermore, in which it may be assumed that the population "at risk" is reasonably well aware of the benefits to which it is entitled. (Or, in the case of children, it may be assumed that parents, who make the medical decisions, are reasonably informed of the fact that they and their dependents are entitled to a broad spectrum of outpatient and inpatient benefits under the plan.)

Briefly stated, the research design was as follows. A study was made of all inpatient and outpatient services rendered at the Oakland facility of the Permanente Medical Group to 8,874 children who were (1) members of families in Berkeley or Oakland who had (2) been members of the Kaiser Plan continuously for at least four years. The study group thus included some children as young as four years, if they had been enrolled at birth; the limits of childhood were defined as fifteen years. The four year requirement was presumably incorporated to eliminate families which had joined the plan for a brief time to have some specific condition cared for; such ad hoc members would obviously have ^{had} a distorting effect on the data.

Several methodological limitations must be noted. (1) The medical service records studied did not necessarily include all care received by the 8,874 children in question. Under the terms of their health plan, members would have been fully entitled to use Kaiser facilities in San Francisco, Vallejo, and other parts of the Bay Area. Furthermore, in cases of genuine emergency, they are allowed to go to another facility or private practitioner and be reimbursed by the plan. Finally,

it is known that some Kaiser members use the plan essentially for inpatient hospitalization only, and prefer to obtain doctor's office and home care on their own and pay for it out-of-pocket. None of these forms of care appears in the findings of this study, and to that extent all morbidity numbers and rates are understated. It is impossible to estimate the extent of this underreporting with any degree of certainty, but it perhaps comes to between 5% and 10%, altogether.

In less rigorous studies, the other side of the coin might be a problem as well: persons who use the Kaiser facilities but who are not members and would therefore tend to blur the denominator. By law, the Kaiser hospitals must serve nonmembers on at least an emergency basis. This problem, however, does not becloud the present study because of the limitation to children who had been members of the plan for four years or more.

(2) All data in the report are restricted to cases in which the patient's medical record was explicit as to type of accident. For fully one-fifth of the injuries, the accident type was unknown. This becomes a major consideration in such injuries as contusions and lacerations, where the ^{nurse or} attending physician failed to ascertain or to record whether the accident was incurred in an automobile, on a bicycle, while playing football, etc. However, there is reason to believe the amount of underreporting of this type was far less serious in the case of poisonings, where the "nature of injury" and "type of accident" are virtually synonymous.

(3) Because there is no problem of billing and fee-collecting in a prepayment plan such as Kaiser, there is substantially more consultation over the telephone than would likely be found in solo-practice, fee-for-service medicine. Simple pediatric advice is frequently given over the telephone by nurses, whereas a nurse employed by a private practitioner, unless she knew the circumstances unusually

well, would be inclined to say, "You'd better bring your child into the office." For example, a parent might call the Kaiser Pediatric Department and say, "My child just chewed on a crayon. Should I bring him in?" The nurse who took the call would ^{probably} not trouble a physician. "Did he swallow much?" "Oh, maybe a quarter of an inch." "Does it say anything on the box?" "It says n-o-n t-o-x-i-c. What does that mean?" "It means that you have nothing to worry about." The child's medical record would not be pulled in a case like this, and thus it would not appear in any of our data. This might be a source of considerable understatement, by comparison with studies based on the records of private practitioners.

(4) The study was limited to cases which had a non-fatal outcome. Some poisoning cases may legitimately be considered both morbidity and mortality. The victim does not die immediately, but lingers in the hospital for several days before death occurs. In a group of 8,000 or 9,000 children, 0-15 years, however, the statistical probability is that there would not be even one case of this sort in the average year,¹ so the omission of fatal cases does not materially affect the present study.

(5) The definition of poisons in this study was limited to codes N870-894 in the International Classification of Diseases which was in use at that time. These codes do not embrace a number of forms of poisoning which others have suggested should be included in a truly comprehensive definition. They do not include, for example, the bites of venomous animals and insects; they do not include poison oak; they do not include therapeutic misadventures. These omissions may not be

¹ To be exact, the death rate for poisonings of all types is 0.7 per 100,000 in this age group in California. Even if all were hospitalized before death, in a population of 8,874 one would expect to encounter such a case only once every sixteen years or so. This is, incidentally, a fair indication of the difficulty in conducting poisoning mortality studies on any kind of sample basis.

crucial, but the effect, once again, is to understate the extent of poisoning morbidity, compared to what might be found in a study which employed a broader conception of poisoning.

(6) It may be argued that the Kaiser membership is not statistically representative of the Berkeley-Oakland population as a whole. In medical care studies in general, it is quite true that persons with health insurance are unrepresentative: they tend to be more affluent, to have higher educations, to live in better houses, to drive safer cars, and so forth. These factors probably combine to produce a lower rate of poisonings and other types of accidents. The Kaiser plan, however, is different from many forms of health insurance in that it is often negotiated as a fringe benefit by a labor union, and thus includes a far larger proportion of semiskilled and unskilled workers, and minority races and ethnic groups, than most private insurance plans. In the study population, 71.4% of the children were "white", 21.1% Negro, 4.6% Oriental, 2.9% other and unknown: percentages quite similar to the racial composition of the East Bay at the time of the study (May, 1960). In terms of father's occupation, 29.3% were professional, technical, and managerial; 35.3% clerical, sales, and skilled labor; 21.0% semiskilled and unskilled labor; and 14.2% other and unknown: again, the distribution does not depart strikingly from the results of the census conducted just one month earlier.

(7) Probably the most serious limitation is that all the data below are confined to cases receiving medical attention. Some presumed poisoning cases which come to a physician's attention are merely suspected and not confirmed. These we may call "false positives". There are ways of estimating in at least a crude way the proportion of "false positives". But there is no good way of estimating, here or elsewhere, what proportion of the series may have been "false negatives:" i.e., children who may have ingested something harmful, but who do not come into contact with a phy-

physician because an adult in the family does not judge the matter serious enough, because someone thinks he knows a home remedy that is efficacious, because advice is obtained over the telephone, or for some other reason.

Although the exact extent of underreporting of this type cannot be hazarded, there is every reason to believe it is considerable. For example, it was found in the present study that the rate of medically attended injuries among "Whites" was 267.6 per 1,000 children per year; among Negroes, the rate was 189.7 per 1,000 children per year -- a difference significant at the .0001 level of confidence. However, among the 95 Negro children whose fathers were in the most advantaged occupational bracket (professional, technical, managerial), the rate was not so different from that of "whites": 236.5. It is scarcely credible that the accident rate is, in fact, lower in the slums than in suburbia; the truth is probably quite the opposite.¹ What is actually at work, apparently, is a socio-economic-cultural factor: given the same types and severity of illnesses or injuries, the poor seek medical care far less frequently than the well-to-do. This seems to hold true even when economic barriers are removed, as in the Kaiser plan. It may be because of habit, dating from the time when a doctor visit represented a tremendous financial sacrifice; it may be because of semi-illiteracy, and an unawareness of the benefits of the new plan; the reasons bear more looking into than they have ever received. The point is important to anyone concerned about the portion of the morbidity iceberg that does not come to medical attention and remains hidden beneath the surface. There can be little doubt that there is a certain amount of morbidity among the affluent which is "sweated out" at home, unattended. But there can be

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little doubt, too, that the greater part of the subaqueous iceberg is made up of the unskilled and unemployed and underemployed -- most of whom, as things now go, happen to have dark skins, and to live in either urban or rural slums.

Notwithstanding all this, it seems a reasonable hypothesis that there is less underreporting in the present study than in others which might be based on medically attended cases. Substantial as the cultural gap demonstrably is within Kaiser subscribers, it is perhaps a less distorting influence than in other large, heterogeneous populations which might be studied. As already indicated, the traditional economic barriers to medical care have, for most practical purposes, been removed in a comprehensive prepayment group practice plan. And it is worth recalling, furthermore, that the present study was limited to children whose parents had been members of the Kaiser plan for four years or more. Presumably, unskilled laborers who were completely unsophisticated about their health care benefits at the time of their initial enrollment gained sophistication over the years.

C. The Findings

The study of Kaiser enrollees by the Family Research Center was not concerned primarily with poisonings. Poisonings were only one of twelve types of accidents and ten types of injuries studied. No information is available, for example, on the nature of the poisonous agents involved (see, however, Part II, infra).

The findings which immediately concern us were as follows:

(1) Among the 8,874 children, who on the average had been enrolled in the Kaiser plan for nearly six years, and thus represented a total of approximately 50,000 years of "exposure," 310 cases of "aspiration or ingestion of poison" came to the attention of the study (i.e., received outpatient or inpatient care at Kaiser's Oakland clinic or hospital).

(2) The poisoning incidence rate was thus 6.2 per 1,000 children per year.

(3) Of these, over three-fourths "showed ill effects" or were otherwise verified. The rest remained suspect, but were neither proven nor disproven. The incidence rate of verified cases was 4.8 per 1,000 children per year.

(4) Although the rate of poisoning morbidity was considerably lower than rates from falls, burns, and other types of accidents, it was equal to the rate from motor vehicle accidents, a notorious killer andcrippler of young children.

(5) Most of the poisoning cases were treated in a single physician visit. The average for all 310 cases was 1.1 visits. A significant minority, however, were severe and required considerably more medical attention. 6.8% of the poisonings required hospitalization. The proportion of severe cases was much higher than that for most types of accidents. Only 0.2% of dog bite cases, for example, were hospitalized; 0.7% of "contacts with sharp or rough object"; 3.5% of burns. Taking all types of accidents together, only 2.6% were hospitalized.

(6) Rates were dramatically higher among "creepers" and "toddlers" than among older children:

Table 1

<u>Age Group</u>	<u>Poisonings Per 1,000 Children Per Year</u>
0 - 3	16.7
4 - 7	1.6
8 - 11	0.8
12 - 15	0.3

The implications for prevention seem clear: keep all kinds of poisonous substances high, out of reach; screw caps on tightly; etc. Obviously, "education" of a one or two year old is likely to be of little efficacy; controls must be in the environment.

(7) In all except the teen-age group (where numbers were too small to be statistically significance, anyway), boys had a higher incidence rate than girls.

Table 2

<u>Age Group</u>	<u>Poisonings Per 1,000 Children Per Year</u>	
	<u>Boys</u>	<u>Girls</u>
0 - 3	20.0	12.9
4 - 7	1.7	1.5
8 - 11	1.0	0.5
12 - 15	0.3	0.3

It is not difficult to understand that culturally ordained behavioral differences between the sexes begin operating by the age of four. Boys are expected to be more adventurous, "tough," daring, and so forth, which would tend to lead them into higher rates of poisonings as well as many other types of accidents. But it is not so easy to understand why sex differences in poisoning incidence rates begin virtually in the cradle, before the infants could possibly have any conception of social roles. It looks almost as if parents "accidentally-deliberately" leave aspirin and the like where boy babies can reach it more often than they leave it where girl babies can reach it. This is one way to begin cultural conditioning -- to teach the lesson, for example, that the females of the species can expect to be protected, while the male will be expected to fend for himself -- but it is surely a Spartan form of education, at least as far as boys are concerned.

This hypothesis appears more credible in view of the fact that very young boys (i.e., 0 - 3 years) have higher incidence rates than very young girls for accidents and injuries of virtually every other type, as well as poisonings: burns, 25.0 as against 19.5; lacerations, 92.4 versus 58.6; contusions, 52.3 versus 37.3; and so forth.

D. Extrapolations

It might seem as though extrapolations from Kaiser enrollees were impermissible since, in the absence of an economic barrier to medical care, one might assume utilization rates would as a natural matter of course be abnormally high. The evidence does not bear out this assumption. During approximately the same time as the Kaiser study, a National Health Survey was conducted under the auspices of the U.S. Public Health Service. This survey of a representative sample of all the households in the nation ascertained, among many other things, incidence rates of medically attended injuries -- i.e., exactly the same phenomenon measured in the Kaiser study. Interestingly enough, the over-all rate found in the National Health Survey, in a population where a very small percentage of children were covered by comprehensive group practice health insurance, was higher than that found in a study of children who were all covered by such insurance: 246.1 per 1,000 children per year in the Kaiser plan; 258.5 in the country as a whole.

The difference is not great, and might be explained by a number of intriguing hypotheses, but whatever else they may or may not do, the findings assuredly tend to discredit the notion that the Kaiser method of conveying health care leads to orgies of overutilization and makes it impossible to draw any inferences about health and medical care in the general community. Extrapolation from the Kaiser data on accidents and injuries seems altogether allowable. If anything, such extrapolation may understate the frequency of medically attended injuries in the population at large.

The 1960 census revealed that there were 5,624,000 persons in California 18 years of age or younger. Applying the rate of 6.2 poisonings per 1,000 children per year to this population yields about 35,000 cases. Population figures for intercensal years are, of course, estimations rather than enumerations. In July,

1968, there were probably in the vicinity of 7,168,000 Californians 18 years of age or younger. One does not know, of course, whether the poisoning incidence rate found in the earlier year has gone up, or down, or remained constant. However, assuming that the rate has remained approximately the same, we may expect that there are now something on the order of 45,000 medically attended poisonings among children, annually, in the state of California, and that roughly 3,000 of these are serious enough to warrant hospitalization. (All this is based on a very limited conception of what constitutes a "poisoning," and is thus conservative.)

Beyond this, it becomes increasingly dangerous to extrapolate. We know, for example, that there are about twenty times as many deaths from poisoning among persons over 18 years of age as there are among persons 18 or younger.¹ If one cared to and dared to make the assumption that the relationship between morbidity and mortality was fairly constant within various age groups, one might draw the conclusion that there are about 900,000 cases of medically attended poisoning morbidity in the over-18 population of California each year, (20 times 45,000) and close to a million in the population as a whole (900,000 plus 45,000). Such reasoning would obviously be fallacious, however, since there is every reason to believe the ratio between the death rate and the morbidity rate draws closer to unity in the older age groups. The great majority (86.5%) of poisoning deaths among persons over 18 are suicidal rather than accidental. To be sure, a certain proportion of suicide attempts "fail" -- probably a good many more than "succeed" -- and psychiatrists have advanced plausible theories that the "failures" were not really intended to succeed at all, but were merely notices served upon relatives, friends, or society at large, to start taking the individual's cries for help more

¹ In California, in 1963, for example, there were 87 deaths from poisonings of all types among persons 18 and under; 1,715 among persons over 18.

seriously. Be that as it may, the "unsuccessful" suicides end up in the morbidity rather than mortality statistics. There are unquestionably many of them, for example, among the 1,324 cases of barbiturate poisoning hospitalized in Los Angeles County Medical Center in 1966-67.¹ But the likelihood is ^{almost} certainly less that a case of suicidal poisoning will survive than that a case of accidental poisoning will. It is thus quite inappropriate to attempt to extrapolate from adult mortality data, where the great majority of poisonings are suicidal, to adult morbidity data, on the strength of childhood morbidity data, where the great majority of poisonings are accidental.

PART II: TYPES OF CHILDHOOD POISONINGS

A. Introduction

Another study conducted by the Family Research Center, with the cooperation of the Alameda-Contra Costa County Medical Association, was never published, but provides a useful supplement to the study described above.

The first study, it will be recalled, was concerned with all types of accidents, and did not go into detail concerning subclassifications. There was no detail, for example, on the chemical substances actually involved in the poisoning cases.

At about the same time, another study was conducted: this one specifically concerned with detailed types of poisons ingested by children treated in hospital emergency rooms. Records from all the emergency units in Alameda and Contra Costa Counties were studied for the years 1958 through 1960.

¹ See Anderson, H., "Poisoning Hospitalizations in a Large Medical Center," California Department of Public Health, Community Study of Pesticides, January, 1969, unpublished manuscript.

In several respects, the findings are not strictly comparable to those from the Kaiser study that was being conducted at approximately the same time. The most important difference is that the Alameda-Contra Costa data cannot be referred ~~red~~ to any stable population, and thus cannot be used for the calculation of incidence rates in the way that the Kaiser data were. There is simply too much possible error in ^{the form of} parents taking their children to hospitals out of the study area -- San Francisco and San Jose, for example -- or parents bringing their children into the study area from Solano or other neighboring counties.

B. The Findings

There were no radical changes between 1958 and 1960 in types of chemical agents involved in poisonings. The following table, therefore, represents a summary of findings in all three years. For those with special interests, separate years could be broken out as desired. Furthermore, certain subcategories could be broken out if desired; in the following table, categories with fewer than 20 cases were combined into residual groups.

Table 3

POISONOUS OR TOXIC SUBSTANCES INGESTED BY CHILDREN UNDER 15 YEARS OF AGE
TREATED AT HOSPITAL EMERGENCY UNITS IN ALAMEDA AND CONTRA COSTA COUNTIES,
1958-1960

<u>Type of Substance</u>	<u>Number</u>	<u>Percent</u>
GRAND TOTAL	6,876	100.0
Internal medicines, subtotal	3,420	49.7
Aspirin	1,925	28.0
Hormones and estrogenic preparations	127	1.8
Laxatives	119	1.7
Antihistamines	110	1.6
Barbiturates	121	1.8
Tranquilizers	91	1.3
Cough medicine	113	1.7
Analgesics other than aspirin	110	1.6
Reducing aids, amphetamines, dexadrine	105	1.5
Vitamins and minerals	84	1.2
Antibiotics, sulfenamides	39	0.6
Other and unspecified as to type	476	6.9

<u>Type of Substance</u>	<u>Number</u>	<u>Percent</u>
Household preparations, subtotal	823	12.0
Bleaches	236	3.4
Corrosives, caustics	155	2.3
Disinfectants, germicides	122	1.8
Soaps, detergents	94	1.4
Furniture or floor polishes, waxes	72	1.0
Dry cleaning fluid	45	0.7
Household deodorizers	24	0.3
Dyes and tints	26	0.4
Shoe polishes	23	0.3
Other and unspecified as to type	26	0.4
Pesticides, subtotal	829	12.1
Insecticides	730	10.6
Rodenticides	49	0.7
Snail bait	26	0.4
Other and unspecified as to type	24	0.4
Paints and associated products, subtotal	325	4.7
Paints, non-lead ¹	57	0.8
Paint thinners and solvents	201	2.9
Turpentine	54	0.8
Other and unspecified as to type	13	0.2
External medicines, subtotal	269	3.9
Antiseptics, antibacterials	105	1.5
Skin ointments, etc.	68	1.0
Rubbing alcohol	33	0.5
Other and unspecified as to type	63	0.9
Cosmetics, subtotal	175	2.5
Perfumes, after-shave lotions, etc.	66	1.0
Manicuring aids	44	0.6
Hair preparations	30	0.4
Deodorants	21	0.3
Other and unspecified as to type	14	0.2
Plants, subtotal	183	2.7
Mushrooms, toadstools	59	0.9
Castor beans	52	0.8
Other and unspecified as to exact type	72	1.0
Petroleum distillates, subtotal	144	2.1
Lighter fluid	48	0.7
Gasoline	43	0.6
Kerosene	41	0.6
Other and unspecified as to type	12	0.2

¹ Includes paints unspecified as to lead content.

<u>Type of Substance</u>	<u>Number</u>	<u>Percent</u>
Miscellaneous, subtotal	323	4.7
Ink	34	0.5
Matches	37	0.5
Other ¹	252	3.7
Unknown	385	5.6

These are very interesting findings in a number of respects. For example:

(1) They seem to bear out what was found in a study of Los Angeles County Medical Center inpatient data: that leaded paints are not a major health problem among children in California, contrary to the experience of Eastern cities.²

(2) Unlike the Los Angeles study, however, large numbers of pesticide poisonings were found being treated in Alameda and Contra Costa Counties. A large part of the difference may presumably be accounted for by the fact that the Los Angeles study was confined to inpatient admissions; apparently, most children who swallow ant poison and the like can be treated on an outpatient basis. But further study would be required to understand the difference thoroughly. One cannot rule out the possible role, for example, of agriculture in parts of Alameda and Contra Costa Counties, whereas the Los Angeles County Medical Center serves a central city area in which there is no agriculture whatever.

(3) Household preparations also appear much more prominently in the Alameda-Contra Costa outpatient statistics than they did in the Los Angeles County data. The difference is presumably not due to any drastic distinctions between the lifestyles of the two areas, but to the fact that most cases of ingesting ammonia, rug shampoos, etc., can be treated by lavage and do not require hospitalization. It should also be pointed out that the Los Angeles study included all age groups,

¹ Includes animal medications, spoiled food, tobacco, alcoholic beverages, carbon monoxide, etc.

² See, e.g., R. Griggs, et al., "Environmental Factors in Childhood Lead Poisoning," Journal of the American Medical Association, 187:703-707 (March 7, 1964).

and it may reasonably be assumed that adults swallow liquid detergents, bleaches, and the like, less often than small children just beginning to test their universe.

(4) Addictions -- particularly alcoholism -- which were the most common of all forms of poisoning in the Los Angeles study, appear scarcely at all in this study of children. However, it should be remembered that the Alameda-Contra Costa study was conducted on 1958-60 data, before glue-sniffing and other types of addictions became fads among children 15 years of age and younger.

C. Extrapolations

As indicated, the Alameda-Contra Costa study did not rest upon a known population "at risk", and consequently did not include the computation of incidence rates. However, it does not seem excessively far-fetched to combine some of the findings from the Alameda-Contra Costa study with some of those extrapolated from the Kaiser study. There is no reason to believe the composition of the Kaiser population was different in major respects from the composition of the general population of Alameda and Contra Costa Counties. There is no reason to believe that children who reside in Albany, Richmond, San Leandro, Hayward, and other communities in the two counties sustain significantly different types of poisonings from children who reside in Berkeley and Oakland.

Extrapolating from the 6.2 poisonings per 1,000 children per year found in the Kaiser study, we estimated that at least 45,000 childhood poisonings come to medical attention annually in California. Let us now make the further assumption that these estimated 45,000 cases are distributed by causative agent in approximately the same proportions as the cases in Alameda and Contra Costa Counties. The following results would be obtained.

Table 4

ESTIMATED NUMBERS AND PERCENTS OF POISONING CASES AMONG CHILDREN
18 YEARS OF AGE AND UNDER, RECEIVING MEDICAL TREATMENT, CALIFORNIA, 1968

<u>Type of Substance</u>	<u>Number</u>	<u>Percent</u>
GRAND TOTAL	45,000	100.0
Internal medicines, subtotal	22,365	49.7
Aspirin	12,600	28.0
Hormones and estrogenic preparations	810	1.8
Laxatives	765	1.7
Antihistamines	720	1.6
Barbiturates	810	1.8
Tranquilizers	585	1.3
Cough medicine	765	1.7
Analgenics other than aspirin	720	1.6
Reducing aids, amphetamines, dexadrine	675	1.5
Vitamins and minerals	540	1.2
Antibiotics, sulfonamides	270	0.6
Other and unspecified as to exact type	3,105	6.9
Household preparations, subtotal	5,400	12.0
Bleaches	1,530	3.4
Corrosives, caustics	1,035	2.3
Disinfectants, germicides	810	1.8
Soaps, detergents	630	1.4
Furniture or floor polishes, waxes	450	1.0
Dry cleaning fluid	315	0.7
Household deodorizers	135	0.3
Dyes and tints	180	0.4
Shoe polishes	135	0.3
Other and unspecified as to exact type	180	0.4
Pesticides, subtotal	5,445	12.1
Insecticides	4,770	10.6
Rodenticides	315	0.7
Snail bait	180	0.4
Other and unspecified as to exact type	180	0.4
Paints and associated products, subtotal	2,115	4.7
Paints, non-lead ¹	360	0.8
Paint thinners and solvents	1,305	2.9
Turpentine	360	0.8
Other and unspecified as to exact type	90	0.2

¹ Includes paints unspecified as to lead content.

<u>Type of Substance</u>	<u>Number</u>	<u>Percent</u>
External medicines, subtotal	1,755	3.9
Antiseptics, antibacterials	675	1.5
Skin ointments	450	1.0
Rubbing alcohol	225	0.5
Other and unspecified as to exact type	405	0.9
Cosmetics, subtotal	1,125	2.5
Perfumes, etc.	450	1.0
Manicuring aids	270	0.6
Hair preparations	180	0.4
Deodorants	135	0.3
Other and unspecified as to exact type	90	0.2
Plants, subtotal	1,215	2.7
Mushrooms, toadstools	405	0.9
Castor beans	360	0.8
Other and unspecified as to exact type	450	1.0
Petroleum distillates, subtotal	945	2.1
Lighter fluid	315	0.7
Gasoline	270	0.6
Kerosene	270	0.6
Other and unspecified as to exact type	90	0.2
Miscellaneous, subtotal	2,115	4.7
Ink	225	0.5
Matches	225	0.5
Other ¹	1,665	3.7
Unknown	2,520	5.6

The error inherent in any process of extrapolation -- and here it is compounded, because we have extrapolated in two different ways -- is believed, here, to be in the direction of conservatism. The most basic datum upon which all the above extrapolations rest -- namely, the rate of 6.2 medically attended poisonings per 1,000 children per year found in the Kaiser study -- is actually lower than the rate found in the population of the United States as a whole by the National Health Survey.

¹ Includes animal medications, spoiled food, tobacco, alcoholic beverages, carbon monoxide, etc.

Many other qualifications and caveats might be mentioned. For example, the distribution of poisonous agents would very likely be different in a highly rural area from that found in Alameda and Contra Costa Counties, just as it would be different in a wholly urbanized area, such as central Los Angeles. However, taking the state of California as a whole, Alameda and Contra Costa Counties probably constitute as representative a cross-section as could be found: mostly urban and suburban, but with some semi-rural and rural; some virtually all-black ghettos and some virtually all-white ghettos; etc.

Thus, it would be somewhat presumptuous to base a program of prevention and control in Shasta County on the foregoing distribution. But if one were concerned with the problem of poisonings among children in California as a whole, one would probably not be led too far astray if one took the above estimates into consideration in deciding what aspects of the problem were most serious, where to place the major emphasis in health education, and the like.